# And citation begat co-citation . . .

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*ISI Atlas of Science: Biochemistry and Molecular Biology 1978/80.* Pp.540. ISBN 0-941708-00-4. (Institute for Scientific Information, Philadelphia: 1982.) $45 (individual), $90 (institution).

THE information explosion is daunting to most people but challenging to others, including Eugene Garfield and his colleagues of the Institute for Scientific Information (ISI) in Philadelphia, who have devoted themselves to the systematic collection and organization of information. First came *Current Contents*, the usefulness of which is universally acknowledged. The commercial success of *Current Contents* allowed the production of the *Science Citation Index*, which is widely but less generally used. More recently the Institute has published *Research Fronts in ISI/Biomed* and now the *ISI Atlas of Science*, a reference work to 102 Research Fronts or "Specialties" within the fields of biochemistry and molecular biology.

The Research Fronts included in the *Atlas* were identified by frequent citations in the *Science Citation Index*. The central process of selection of papers was the process termed "co-citation clustering". This is when an author, in citing the works of two other authors, establishes an intellectual link between them. The papers quoted in the *Atlas* were both highly cited and frequently co-cited. This computer analysis is supposed to reveal sets of papers that are important, because of the attention they have received from colleagues of the authors, and highly related because of the co-citation linkage. For each specialty, maps are constructed in which the documents are arranged graphically according to a mathematical treatment of co-citation patterns. The same treatment is also used to construct a Global Map, which shows the relationships among the various specialties in biochemistry and molecular biology.

For each specialty there is a section entitled "Citation Core Documents" which comprises the main citations and co-citations constituting the cluster. This is intended to provide objective assessment of clustering and case documentation, instead of the usual subjective assessment by individual scientists. There is a short, one-page mini-review of each specialty.

The unique feature of the *Atlas* is the Specialty Maps and the Global Map, but it can be questioned whether this is the most useful way to employ computers. The value of computers for information retrieval, especially for recovering associated information (e.g. on prostaglandins in a particular cell type) is well established and has lightened this burden for most scientists. Listing the Citation Core Documents for each specialty is helpful, although similar information can be obtained through the *Index Medicus* and other compilations. A brief perusal of these documents will often establish their relatedness more surely than the maps, which are for the most part statements of the obvious and are at times misleading.

It can also be questioned whether, for persons intending to go into a field seriously, reviews of specialties by various experts, such as are found in the *Annual Review of Biochemistry*, do not provide equally accessible and more authoritative and up-to-date sources of information than the data in the *Atlas* (most of the analyses in the *Atlas* were completed before 1980, but supplements refer to major citations in 1980).

The general conclusion is that the thirst for information is not easily satisfied, and that the *Atlas* does provide a ready source of information on a range of subjects. Certainly, it is likely to be widely sold and used. □

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# Mitochondria: the cell's paying guests?

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*Mitochondria.* By Alexander Tzagoloff. Pp.342. Hbk ISBN 0-306-40799-X; pbk ISBN 0-306-40778-7. (Plenum: 1982.) Hbk $42.50, £26.78; pbk $19.95, £12.57.

MITOCHONDRIA have provided interesting and challenging subjects for study by biochemists and cell physiologists ever since it became possible, in the early 1950s, to isolate them in quantity and quality. The reason for this interest is that the organelles have an integrated set of functions which, although complex, is more simple than that of a whole cell; for instance it was soon recognized that they contained complete sets of enzymes for the citric acid cycle and fatty acid oxidation. In his new book, Alexander Tzagoloff appropriately describes these metabolic pathways in brief, in only one of the eleven chapters; most readers can be expected to be well acquainted with them.

The central chapters of *Mitochondria* deal with the properties and functions of the membrane-bound enzymes and carrier systems, including the vital function of regenerating ATP by oxidative phosphorylation. The story of the investigation of these systems should be a fascinating and salutary tale. The classical techniques and concepts of aqueous phase biochemistry failed to resolve the mechanisms, and new methods and ideas for membrane biochemistry had to be developed. Sad to say I found this, the longest and a very important section, somewhat disappointing. The author appears to give unenthusiastic acceptance to the chemiosmotic coupling theory and these chapters are not as up-to-date as they should be, few papers after 1978 being cited. The treatment is patchy and sometimes falls far short of what is needed. For example, descriptions of ions simply as "permeant" can be misleading, as is describing uncouplers as "blocking" reactions; and are we really not sure that valinomycin is a mobile carrier and gramicidin a pore-former? The failure to describe the proton-conducting function of the membrane-embedded component detracts seriously from the treatment of the ATPase complex.

The last two chapters, on mitochondrial biogenesis and genetics, make more exciting reading. Over the past 20 years mitochondria have been found to contain not only their own DNA but a complete apparatus for synthesizing a few polypeptides. And whilst a decade ago the mitochondrial protein synthesizing system appeared to be very similar to that of prokaryotes, major differences are now being discovered — not only between the mitochondrial and prokaryotic systems but also between mitochondrial systems from different organisms. The idea that mitochondria are the descendants of symbiotic prokaryotes which paid for their keep in the ancestral eukaryote cell by regenerating ATP is now no more plausible than the alternative that mitochondria arose by segregation of certain functions and some DNA within the eukaryote. Whichever is the case, it is clear that mitochondria are now set to be a testing ground for fundamental investigations in molecular genetics and into the evolution of eukaryotic cells.

Tzagoloff helps to fill the gap left by the failure to revise Lehninger's *The Mitochondrion* since it first appeared in 1964. He provides much of the basic material which a research student working with mitochondria will need to know. Teachers of advanced undergraduate courses will also want a copy, and one or two in the library, but they will have to supplement and comment on the bioenergetics chapters. □

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